

PRELIMINARY STUDIES OF FLEAS ON RATS (*RATTUS NORVEGICUS*) IN NEW JERSEY¹

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The few studies of fleas on rats which have been made in the northeastern United States have been limited to seaports such as New York (Williams, 1929 and Fox and Sullivan 1925) and Philadelphia (Vogel and Cadwallader 1935). Studies in these areas have shown *Xenopsylla cheopis*, the oriental rat flea, to be the dominant species.

In the spring of 1951 a survey of domestic rat parasites was started in New Jersey to determine ultimately the kinds of ectoparasites and their distribution in the state. These studies are being supported in part by the New Jersey State Department of Agriculture. This paper briefly summarizes the data on fleas taken from rats (all *Rattus norvegicus*) between June 1, 1951 and January 31, 1952. Most of the animals were taken in northeastern New Jersey where initial studies were made on rats inhabiting garbage and refuse dumps. The place names used in the discussion do not necessarily denote that the dump is owned or operated by the municipality mentioned.

To obtain fleas and other ectoparasites, rats were captured on the dumps by driving them from their burrows with calcium cyanide or by running a bulldozer through the area and killing the rats as they emerged. As soon as killed, each animal was placed in a two quart jar containing a quart of water, and small quantities of lindane and a wetting agent. Several different wetting agents were tried with equal success. Each jar was set aside for at least 2 hours and then was shaken vigorously 100

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times to wash parasites from the animal. After this washing the rat was removed, and length and sex were recorded. Liquid remaining in the jar was passed through a sieve (60 meshes to the inch) to collect the parasites. Parasites and debris collected on the screen were washed from the screen and stored in 70% alcohol. For study, fleas were mounted on slides in the usual fashion and identified by the junior author. Doubtful specimens were checked by Dr. Harry D. Pratt of the United States Public Health Service in Chamblee, Georgia.

Data for fleas taken from rats collected in dumps between June 1 and September 30, 1951 are set forth in Table I.

TABLE I
FLEAS TAKEN FROM RATS CAPTURED IN DUMPS IN NEW JERSEY FROM
JUNE 1 TO SEPTEMBER 30, 1951.

	No. Coll.	Total Rats	Total Fleas	<i>Xenopsylla cheopis</i>	<i>Nosopsyllus fasciatus</i>	<i>Ctenocephalides felis</i>
Englewood	4	13	0			
Teaneck	1	1	0			
Palisades Park	6	20	0			
Fairview	4	69	2	2		
Secaucus	5	89	14			
Union City	4	72	0			
Jersey City	3	58	37	35	1	1
Hackensack	3	35	0			
Hasbrouck Hgts.	1	4	0			
Lyndhurst	3	13	0			
N. Arlington	4	80	6	2	2	2
Newark	5	103	130	116	11	3
Rahway	5	54	3			3
Perth Amboy	8	164	33	32		1
South River	5	82	17	16		1
Bloomington	5	45	0			
Boonton	1	2	1			1
Pine Brook	5	46	2			2
Dover	1	8	2			2
Newton	1	15	1			1
Phillipsburg	1	6	1	1		
Hightstown	1	11	0			
Bordentown	1	12	0			
Camden	1	6	12	12		
		1008	261	230	14	17

Greatest numbers of fleas were taken from the large rat populations found in the larger dumps. *Xenopsylla cheopis* was by far the most abundant flea making up 88.1% of the fleas collected

and 89.7% of those collected in the metropolitan area. Only two other fleas were taken, namely, *Ctenocephalides felis* and *Nosopsyllus fasciatus*. The flea index was low, only 0.26 fleas being taken per rat at the locations shown in Table I. The first 16 locations in the table can be considered as representative of north-eastern New Jersey. In these areas 902 rats had 242 fleas for a flea index of 0.27. It is worthy of note that *X. cheopis* was the predominant flea but occurred only in the localities surveyed which were closest to port facilities, i.e., New York harbor or Raritan Bay.

The seasonal distribution of fleas followed the pattern found in other surveys in this part of the country—a low flea population in June increasing to late August and then dropping very rapidly. In late August at one location, the flea incidence reached a high of 5.1 *X. cheopis* per rat for the 20 rats captured.

Through the winter additional collections have been made in dumps in various areas of the state, as shown in Table II.

TABLE II

Location	County	No. Coll.	Total Rats	Total Fleas	<i>Xenopsylla cheopis</i>
Fairview	Hudson	1	18	0	
Secaucus	"	2	9	2	2
Union City	"	1	10	0	
Jersey City	"	2	26	0	
N. Arlington	Bergen	2	21	0	
Newark	Essex	2	35	0	
Rahway	Union	3	33	0	
Perth Amboy	Middlesex	2	24	31	31
South River	"	2	21	0	
Belvidere	Warren	1	11	0	
Washington	"	1	11	2	2
Flemington	Hunterdon	1	11	0	
High Bridge	"	1	10	0	
Lambertville	"	1	10	0	
Bernardsville	Somerset	1	10	0	
Raritan	"	1	10	0	
Wrightstown	Burlington	1	1	0	
Bordentown	"	1	12	0	
Westmont	Camden	1	7	0	
Audubon	"	1	1	0	
Woodbury	Gloucester	1	4	0	
Salem	Salem	1	10	0	
Deerfield	Cumberland	1	2	0	
Atlantic City	Atlantic	1	5	0	
			312	35	35

It will be noted that these collections were made in 24 areas spread through 14 of New Jersey's 21 counties. However, in these winter collections, *X. cheopis* was the only flea taken and that at only 3 locations. Rats at one new location outside a port area, namely, Washington, were found to have this flea. No other species of fleas were taken in these winter collections. A total of 35 fleas were removed from the 312 rats taken on dumps.

Through the winter, some collections were made in buildings by the use of snap traps. Data for these collections are set forth in Table III.

TABLE III
FLEAS FROM RATS TAKEN INDOORS IN SNAP TRAPS FROM OCTOBER 1, 1951
TO JANUARY 31, 1952.

	No. of Build- ings	Total Rats	Total Fleas	<i>Xenopsylla cheopis</i>	<i>Nosopsyllus fasciatus</i>	<i>Cerato- phyllus gallinae</i>
Jersey City	6	25	52	52		
Springfield	1	1	0			
Union	1	1	0			
Kingston	1	6	0			
Hampton	1	1	0			
Belvidere	1	5	2		2	
Frenchtown	1	1	2			2
Flemington	3	14	1		1	
White House Sta.	1	1	0			
Pennington	1	1	2		2	
Hopewell	1	2	0		1	
Vineland	1	11	4		4	
Bridgeton	1	1	1		1	
TOTAL	20	70	64	52	10	2

Most extensive trapping was done in Jersey City, where 25 rats were taken in 6 buildings. Eighteen of these rats were taken from a heavily infested feed mill. The only fleas taken on these rats were *X. cheopis*. The flea index for this rather small sample of the rat population was 2.08 per rat. This index is nearly 10 times that for summer collections of rats in dumps.

As shown in Table III, the other collections were made mostly in rural areas. In these places *N. fasciatus* was occasionally encountered and was the only flea captured except for one collection at Frenchtown. Here in a poultry hatchery on the only rat

trapped a male and a female *Ceratophyllus gallinae*, the common chicken flea, were taken. As far as we know this is a new host record.

SUMMARY

Between June 30, 1951 and January 31, 1952, 1390 *Rattus norvegicus* were captured in New Jersey in a preliminary study of the ectoparasites of domestic rats. A total of 360 fleas were taken from these animals. *Xenopsylla cheopis* was collected from 8 dumps in northeastern New Jersey and from 3 other locations. Of the total fleas taken in the metropolitan area from June 1 to September 30, 89.7% were *X. cheopis*. Other fleas collected were *Nosopsyllus fasciatus* and *Ctenocephalides felis*. In winter collections (October to January) only *X. cheopis* was taken from rats on dumps. Rats trapped in buildings were found infested with *X. cheopis* in a large city and with *N. fasciatus* in rural areas. Two specimens of *Ceratophyllus gallinae* were taken from a rat trapped in a poultry hatchery at Frenchtown. It is planned to continue these studies and to expand them into other areas of New Jersey.

REFERENCES

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